

AMENDMENT TO THE SPECIFICATION

Replacement paragraph for the paragraph beginning at Page 8, Line 10 and ending at Page 8, Line 25:

However, when the circuitry in the transmitter is damaged, for example by a lightning strike or other event, and the quiescent current required by the transmitter rises to 3.5 milliamps, the transmitter will not be able to transmit the low alarm signal of 3.6 milliamps without affecting any HART® digital communications. The HART® communications will not have sufficient head room (HART® protocol requires ± 0.5 mA modulation for communication) beyond the quiescent current draw ~~for transmission~~.

For example, the digital signal used in HART® transmissions will be "clipped" such that it has an average value which is not zero. This will introduce an error into the analog current level. Further, queries (typically in a digital format) sent to the transmitter may be unsuccessful.

Replacement paragraph for the paragraph beginning at Page 11, Line 10 and ending at Page 11, Line 24:

The quiescent current can be measured using any appropriate technique. In one example embodiment, the transmitter measures current draw by monitoring the voltage drop across a current senseor resistor. The current draw can also be inferred from multiple measurements such as voltage drops or current draws of multiple components. Such a current sensor may exist in the circuitry used to power the various modules or may be added as an additional component. The quiescent current draw of the feature module electronics 50 can also be determined by measuring the voltage drop across a current sensor resistor or by measuring the total quiescent current draw of the transmitter 12 and subtracting the measured quiescent current draw of the sensing module electronics 52.

Replacement paragraph for the paragraph beginning at Page 11, Line 25 and ending at Page 12, Line 23:

The quiescent current diagnostic techniques of the present invention can also be used for predicting communication difficulties or communication impending failures. For example, as the quiescent current draw increases, distortion occurs in the communication signal due to insufficient current head room carried on the two wire process control loop 18. Foundation Fieldbus for example requires a minimum of ± 8 mA modulation for communication. Prior to generation of such errors, the transmitter can provide a diagnostic output indicative of the impending failure. This configuration can be particularly advantageous in devices which communicate exclusively in a digital format. On such a device, if the quiescent current draw prevents transmission of a digital signal, the device has no other means by which to transmit diagnostic information. Therefore, with such a configuration, the process device can transmit an indication of an impending failure, prior to ultimate failure. In another example, the device can activate circuitry to disconnect itself from the communication for the process control loop. For example, if the quiescent current draw of the device has reached or is trending in a direction in which the loop will cease to function, the device can transmit a warning of impending failure and/or disconnect itself from the loop such that the loop can continue to operate.

Replacement paragraph for the paragraph beginning at Page 13, Line 25 and ending at Page 14, Line 2:

The diagnostic circuitry is implemented as microcontroller 60 which couples to a feature module power regulator 120, a digital to analog converter 122 and ~~in~~ an analog to digital converter 62A. Analog to digital converter 62A couples to resistors 62B and 62C and is configured to measure the loop current through the connection to resistors 130 and 132.